TITLE OF THE INVENTION

[0001] Hand-Operated Jointed Control Lever

APPLICANT(S)/INVENTOR(S)

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CROSS REFERENCE TO RELATED APPLICATIONS

[0010] This application is a non-provisional application claiming priority of pending U.S. provisional application 60/419,981 (filed October 21, 2002) entitled "Control Lever - Jointed to Prevent Breakage," fully incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0011] Not applicable.

REFERENCE TO COMPACT DISC(S)

[0012] Not applicable.

BACKGROUND OF THE INVENTION

[0015] 1. Field of the Invention: The present invention relates, in general, to hand-operated control levers for engaging and disengaging an apparatus, and in particular, to a hand-operated control lever that engages and releases a linkage when operated in a first direction, but that becomes disjointed to prevent breakage when forced to move in other directions.

[0020] 2. Description of Related Art: Hand-operated control lever mechanisms are well-

known for use on vehicles such as motorcycles, bicycles, all-terrain vehicles, and the like, so as to operate a clutch or a brake, etc. However, prior art levers are prone to breakage in the event of an accident or when the vehicle falls over, and the broken lever can seriously maim the rider when broken metal edges lacerate the riders hands, limbs, and torso.

[0025] It is therefore desirable to have an improved control lever that allows normal operation when moved in a first direction by the operator's grip, but that releases without breaking when moved in other directions. It is further desirable that the control lever naturally return to its normal mode of operation when the abnormal stressing forces of an accident or fall are removed from the lever. It is still further desirable that the control lever not engage its linkage mechanism when moved in directions other than the normal direction of operation.

[0030] A preliminary patentability search in Class 74, Subclasses 523, 502.2, 501.6 and 489, and also using text searching on the Patent and Trademark Office EAST database system, produced the following patents, some of which may be relevant to the present invention: Ross-Myring, U.S. Patent No. 4,088,040 (issued May 9, 1978); Lee, U.S. Patent No. 5,954,161 (issued September 21, 1999); Shirayanagi, U.S. Patent No. 6,393,933 (issued May 28, 2002); and Brainard, U.S. Patent 6,516,682 (issued February 11, 2003).

[0035] The inventor is also aware of the following prior art: Dawson, U.S. Patent No. 4,726,252 (issued February 23, 1988); Hornady, U.S. Patent No. 4,730,509 (issued March 15, 1988); Warren *et al.*, U.S. Patent No. 6,047,611 (issued April 11, 2000); and Barnett, U.S. Patent No. 6,393,936 (issued May 28, 2002).

[0040] Ross-Myring, U.S. Patent No. 4,088,040 (issued May 9, 1978), discloses a control lever that disjointingly pivots about a circumferential surface of a circular pivot ring (see Figs. 2 - 7). The handle pivots in all directions and is retained to its mounting by the actuating cable. A disadvantage of the lever disclosed in the Ross-Myrig is that it actuates the cable operated by the lever when the lever is pivoted in any direction.

[0045] Lee, U.S. Patent No. 5,954,161 (issued September 21, 1999), discloses a control

lever that pivots in a single plane about an arcuate surface, but the lever does not allow sidewardly disjointed pivoting.

[0050] Shirayanagi, U.S. Patent No. 6,393,933 (issued May 28, 2002), discloses a control lever that pivots sidewardly and in and out, but the pivoting is about fixed axles without becoming disjointed.

[0055] Brainard, U.S. Patent 6,516,682 (issued February 11, 2003), discloses a pivoting lever but, like older levers, pivots about an axle pin in a single plane rather than becoming disjointed.

[0060] Dawson, U.S. Patent No. 4,726,252 (issued February 23, 1988), discloses a lever arm that pivots about dual axle pins but does not become disjointed.

[0065] Hornady, U.S. Patent No. 4,730,509 (issued March 15, 1988), discloses a break-away control lever that is pivoted on a two-pronged fork about fixed axle pivot pins and becomes dislocated when forced out of its direction of normal motion.

[0070] Warren *et al.*, U.S. Patent No. 6,047,611 (issued April 11, 2000), discloses multi-pivoted lever that pivots in multiple planes. However, like other references, it pivots about a plurality of fixed pivot axle pins.

[0075] Barnett, U.S. Patent No. 6,393,936 (issued May 28, 2002), discloses a handle that pivots about a fixed pivot pin axle in one plane.

[0080] Additionally, the inventor is aware of some advertisements for so-called "unbreakable" clutch levers from searching the internet: "Bob's Cycle & Snowmobile Supply Lever ASV Clutch Hydrlc [sic]," found at internet URL http://www.cpostores.com/bobscycle/browse.cfm/4,44724,1,39,2310.html (date unknown), and "ASV Inventions Clutch Lever," found at internet URL http://www.motoworldracing.com/asv_lever.html (date unknown), both disclose discloses a pivoting lever that pivots outward. The lever pivots about a fixed pivot pin in one plane only and not side-to-side. Another advertisement, "Arcx Folding Lever - Just Like Sebastian Uses," found at URL http://www.arclevers.com/tests/arclevers.html (April and May, 2000),

discloses a double-jointed lever that can pivot outwardly but not sidewardly, and does not appear to disjoint about an arcuate fulcrum surface.

[0085] None of these references, either singly or in combination, disclose or suggest the present invention.

BRIEF SUMMARY OF THE INVENTION

[0100] The present invention is a hand-operated control lever that operates normally and engages and releases a linkage when moved in a first arcuate direction, but that becomes disjointed when forced side-to-side or outwardly in the reverse of the first arcuate direction.

[0110] It is an object of the present invention to provide an improved hand-operated control lever that allows normal operation when moved in a first direction by the operator's grip, but that releases without breaking when moved in other directions. It is another object of the present invention that the control lever naturally return to its normal mode of operation when the abnormal stressing forces of an accident or fall are removed from the lever. Still another object of the present invention is that the control lever not engage its linkage mechanism when moved in directions other than the normal direction of operation.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0200] Fig. 1 is a perspective view of the present invention shown attached to a handlebar of a vehicle.

[0210] Fig. 2 is a side view of the present invention shown attached to a handlebar of a vehicle, with the lever in the released position.

[0220] Fig. 3 is a side view of the present invention, similar to Fig. 2 except with the lever assembly shown pivoted toward the handlebar.

[0230] Fig. 4 is a longitudinal sectional view of the invention shown removed from the mounting bracket.

[0240] Fig. 5 is a side view of the present invention with the lever arm shown disjointed from the lever body and pivoted outwardly away from the handlebar.

[0250] Fig. 6 is a view of the front end of the lever arm showing the second fulcrum surface, taken substantially from a view position of line 6-6 shown in Fig. 5.

[0260] Fig. 7 is a view of the rear end of the lever body showing the first fulcrum surface, taken substantially from a view position of line 7-7 shown in Fig. 4.

[0270] Fig. 8 is a side view of the tensioning spring and cable assembly with tensioning adjustment screw.

[0280] Fig. 9 is an exploded parts diagram of the present invention with the spring and cable assembly removed for clarity.

[0290] Fig. 10 is a top view of the present invention with the lever assembly not being disjointed.

[0300] Fig. 11 is a top view of the present invention, similar to Fig. 10 but with the lever assembly being disjointed toward a first side.

0310] Fig. 12 is a top view of the present invention, similar to Fig. 11 but with the lever assembly being disjointed toward a second side.

[0320] Fig. 13 is a side view of the present invention showing operation of the lever-to-perch angle adjustment screw.

[0330] Figs. 14 and 15 are partial views of Fig. 13, showing the lever-to-perch angle adjustment screw being used to adjust the lever-to-perch angle.

DETAILED DESCRIPTION OF THE INVENTION

[1000] Referring to Figs. 1-3, the hand-operated jointed control lever assembly **20** of the present invention is shown mounted to a well-known cylindrical handlebar **22** of a vehicle (not shown) such as a motorcycle, an all-terrain vehicle ("ATV"), a bicycle, a water-powered jet ski, etc. The handlebar has a well-known grip **24** about one end thereof, and a well-known linkage, such as a cable linkage **26** or a rigid mechanical linkage (not shown) is operated as by reciprocation or in another manner well-known to those skilled in the art. Mounted to the handlebar is a well-known mounting bracket or so-called "perch" **28** (see also

Fig. 9) having left and right halves **29, 30** that are clamped together by screws **31, 32** so as to entrap the handlebar **22** and fixedly mount the bracket **28** thereto in a manner well-known to those skilled in the art. Bracket **28** is provided with a pivot axis screw **34** and nut **36** that typically mount a control lever to the bracket **28** in a well-known manner for pivoting movement of a control lever about the pivot axis screw **34**, which passes through a bore **38** in bracket **28**.

[1010] Well-known cable linkage **26** preferably is received into a well-known linkage adjusting screw **40** that is axially threaded into a well-known knurled linkage adjusting nut **42** that can be turned to adjust "play" from the linkage in a manner well-known to those skilled in the art. Adjusting screw **40** and adjusting nut **42** preferably are longitudinally radially slotted (**43** and **44**, respectively) so as to permit them to be slipped over the cable **45** without having to remove the cable anchor **46** from the end of the cable **45**.

[1020] Referring now to Figs. 1 through 15, control lever assembly **20** comprises a lever body **50** mounted for pivoting movement, about pivot axis screw **34** passing through bore **52** in lever body **50**, from a released position shown in Figs. 1 and 2 to an actuated position shown in Fig. 3. Typically, control lever **20** will, when operated, actuate the clutch or brakes of the vehicle in a manner well-known to those skilled in the art. When the operator grips the control lever and moves it from the released position to the actuated position, the brakes will become actuated or the clutch will become disengaged in the usual manner through the linkage **26**, depending on which is being controlled by the control lever **20**.

[1030] Lever body **50** preferably is formed of left and right halves **54, 56** (see Fig. 9) that are secured together by a plurality of screws **58**. Lever body **50** has arcuate rearward first fulcrum surface **60** and a rearwardly-extending lip **62** proximate first fulcrum surface **60**.

[1040] Control lever assembly **20** further comprises a lever arm **64** having a forward edge portion **66** and an arcuate second fulcrum surface **68** proximate forward edge portion **66**. As best seen in Fig. 4, first and second fulcrum surfaces **60, 68** are preferably respectively cylindrically concave and convex and are adapted for mating engagement when forward edge

portion **66** is engaged under lip **62**.

[1050] Control lever assembly **20** further comprises tensioning means **70** (see Figs. 4 and 8) for applying a contraction force between first and second fulcrum surfaces **60, 68** that biases first and second fulcrum surfaces **60, 68** into mating engagement. Tensioning means **70** preferably comprises a tensioning cable **72** that passes through respective bores **74, 76** in first and second fulcrum surfaces **60, 68** (see Figs. 6 and 7). Tensioning cable **72** has first and second ends **78, 80**, with first end **78** having a hexagonal nut **82** crimped thereon into which tensioning adjustment screw **84** is threaded. Bore **76** is preferably hexagonal for receiving hexagonal nut **82** so that nut **82** is prevented from turning as adjustment screw **84** is turned. Tensioning cable **72** passes axially through a tensioning compression coil spring **86** and end **80** of tensioning cable **72** has a retaining head **88** crimped, welded or cast thereon so as to entrap spring **86** on cable **72**. First end **78** of tensioning cable **72** is secured to lever arm **64** by inserting hexagonal nut **82** into bore **76** through second fulcrum surface **68** and then inserting screw **84** through the rearward end of bore **76** and threading screw **84** into hexagonal nut **82** as best seen in Fig. 4. Tensioning spring **86** is thus interposed between second end **80** of tensioning cable **72** and lever body **50**, with tensioning spring **86** being received within a cylindrical cavity **90** formed within lever body **50**.

[1060] With the exception of tensioning means **70**, the components can be CNC machined from aluminum billet but are preferably cast or molded from aluminum alloy or suitable polymer. To assemble the control lever, the tensioning spring of tensioning means **70** is placed within cavity **90** as shown in Fig. 4, the first end **78** of tensioning cable **72** is secured to lever arm **64** as heretofore described, and the halves **54, 56** of lever body **50** are secured together by screws **58**. The tensioning screw **84** can now be adjusted to tension the two fulcrum surfaces together. The control lever can then be mounted by pivot axis screw **34** to bracket **28** as heretofore described, and linkage **26** attached and adjusted in the usual manner.

[1070] It will be understood that the control lever assembly, now mounted, will operate

as a unitary piece as long as it is gripped and moved between the positions shown in Figs. 1, 2 and 3. However, if an accident occurs such that the vehicle falls, then the lever arm will become disjointed as shown in Figs. 5 (disjointed outwardly) and 11 and 12 (disjointed sidewardly), with the tensioning cable **72** holding the lever arm to the lever body and permitting the disjointing with the forward edge portion **66** remaining engaged with the underside of lip **62** of lever body **50**.

[1080] Figs. 13, 14, and 15 show the details of the "perch adjustment screw" **92** that can adjust the angle of the control lever assembly **20** to the perch so as to vary the "reach distance" to the lever arm from the grip when the control lever assembly is in the released position. The perch adjustment screw **92** is threadedly received into the front of the lever body **50** and spaces the lever body from the bracket or perch **28** when in the released position.

[1090] Although the present invention has been described and illustrated with respect to a preferred embodiment and a preferred use therefor, it is not to be so limited since modifications and changes can be made therein which are within the full intended scope of the invention.